

## Lapita Pottery and a Lower Sea Level in Western Samoa<sup>1</sup>

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**ABSTRACT:** Radiocarbon dates are presented supporting previous estimates of a 2800- to 3000-year B.P. age for a collection of Lapita pottery sherds recovered by dredging a now-submerged coastal settlement on the island of Upolu in Western Samoa. New data describing a much enlarged collection are discussed in relation to previously reported materials, and the question of possible changes of sea level as the mechanism for submergence is evaluated.

IN RECENT YEARS, Polynesian origins have increasingly become identified with certain early sites that range from New Britain to Tonga and Samoa and that contain a type of pottery known as Lapita (Figure 1). Excavations of sites in the Tongan, Fijian, New Caledonian, New Hebrides, and Santa Cruz groups and on small islands off the coasts of New Britain and New Ireland have provided data leading to the definition of an associated artifact assemblage—perhaps more properly termed a “cultural complex,” because the array of artifacts from these sites is more varied than the pottery and is not always as distinctive. Thus, it is the easily recognized decorated pottery in every site (Figure 2) that has provided the initial means of linking these materials.

The history of the identification of Lapita assemblages as the ancestral cultural complex from which the earliest Polynesian cultural assemblages were derived has been reviewed by Golson (1971), Groube (1971), and Green (1973). Until recently, however, archaeological evidence for this hypothesis has rested largely on the materials recovered from Fiji and Tonga. The discovery, therefore, of similar materials in Samoa has strengthened considerably the claims made for the same antiquity of settlement there as in the other two island groups and for the development of a distinctive Polynesian cultural assemblage in Samoa itself from local assemblages of the Lapita complex.

The recent discovery of other assemblages with Eastern Lapita-style pottery in Ha'apai, Vava'u, and Niuaupolu in the Tongan group (Davidson 1971, Kaeppler 1973, Rogers 1974), in conjunction with the Samoan discovery, implies that early Eastern Lapita populations were resident throughout the Fijian, Tongan, and Samoan area before any distinctive development of Lapita culture in the Polynesian direction took place. The recovery of a related plain pottery, as in Samoa, from a site on Futuna (B. G. Biggs, personal communication to R. C. Green, Auckland Museum no. 46332, 46371) indicates that in at least three island groups of the region—Samoa, Tonga, and Futuna—local developments of Polynesian-type cultures occurred from founding Lapita populations. However, the sole island group for which we can trace continued continuity of cultural development to present-day Polynesians is in Western Samoa (Green and Davidson 1974: 224), as the last 2000 years of the Tongan sequence is but little known and archaeological investigation in Futuna is being undertaken only now (P. V. Kirch personal communication to R. C. Green). Thus, in the present circumstances, a Lapita site in Western Samoa that extends the sequence of that island group back another 700 years to an early Eastern Lapita-style pottery assemblage is of considerable importance to the documentation of Polynesian origins.

Assistance in the identification and interpretation of the mollusks was given by Dr. R. Tucker Abbott of the Delaware Museum of Natural History in Greenville, Delaware.

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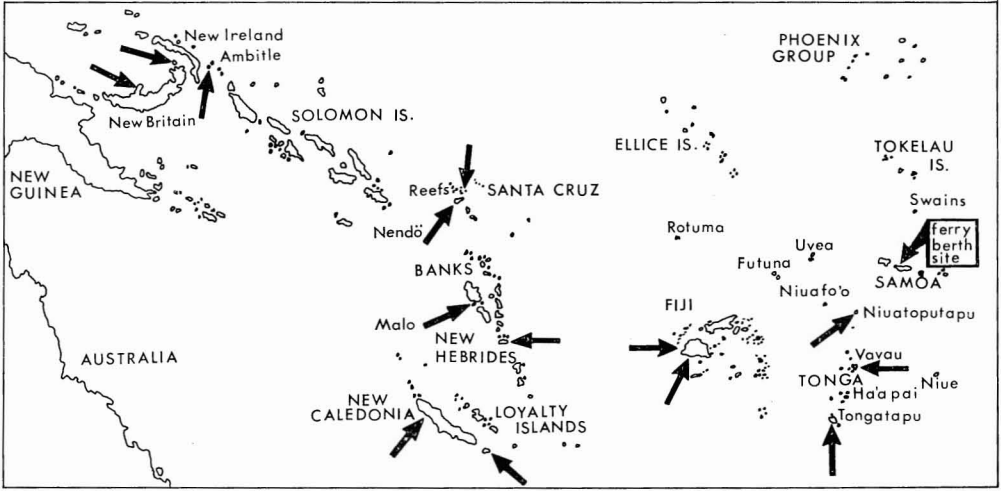


FIGURE 1. Present distribution of sites that have been assigned to the Lapita cultural complex.



FIGURE 2. Design of flat-bottomed Lapita dish from the BS-RL-2 site, Reef Islands, Santa Cruz group.

*Background of Samoan Discovery*

In 1964, when only the outlines of a 2000-year-long sequence for Western Samoa were known, it was necessary to argue that materials belonging to the first third of the Samoan sequence had not as yet been recovered. It was made conditional on a postulated 2000-year antiquity of settlement in East Polynesia and a hypothesis that East Polynesia came from West Polynesia (Green and Davidson, unpublished preliminary report). As investigations continued from 1965 to 1967, the requirement for a Samoan sequence longer than 2000 years was reinforced by the discovery of additional sites with Polynesian Plain Ware pottery.

Polynesian Plain Ware may be distinguished from ceramics of the Lapita series by its total lack of the use of the dentate stamp in decoration and the confinement of such decoration as does occur (less than 3 percent and in some cases none) to the rims of vessels. In addition, there is a concentration on several simple bowl forms of various sizes and shapes at the expense of open-mouthed subglobular pots and an almost complete lack of shouldered and flat-bottomed vessels of types common in Lapita assemblages. This means that continuity is provided by the largely unstudied and undecorated Lapita vessels of bowl shape. Also the spatial distribution of Polynesian Plain Ware is Tonga, Samoa, the Marquesas, and probably Futuna, and its time depth is approximately 4th century B.C. to 3rd century A.D., which contrasts with the island Melanesian distribution of Lapita materials whose time depth is prior to the 4th century B.C.

Yet, the lack of direct evidence of earlier coastal assemblages more closely related to the Lapita examples found in Tonga and Fiji made it difficult to furnish strong support for this position. Thus, it was possible for Groube (1971: 279) to argue that current archaeological examination of Samoa made unlikely the statement that the first 3rd of Samoan prehistory was as yet unexplored, and to see no reason why Samoan settlement had occurred earlier than 300–200 B.C. unless secure dates for East Polynesian settlement were pushed back before the then-accepted datings of 400 A.D. This allowed Groube to conclude that the initial changes

from earlier Lapita assemblages to those with Polynesian Plain Ware took place in Tonga, and only after these occurred did a more Polynesian-like cultural tradition become transferred and established in Samoa and perhaps in other islands of West Polynesia.

There are now several grounds on which this conclusion may be challenged, grounds quite apart from the discovery of Lapita pottery in Samoa. One is the increasing probability that the earliest sites associated with pottery in the Marquesas date to before 300 A.D. and, in fact, have not been investigated (Green 1974: 247). The second is the probability that present coastal settlements on the raised beach sands of Western Samoa date from the last 1500 years (Green and Davidson 1974: 222–223), suggesting that the most likely places for earlier coastal settlement have not been examined. The third is the hypothesis that some changes in Lapita artifacts in the Polynesian direction recorded in the pottery, adzes, and shell tools and ornaments in Samoa are, in part, to be explained by the crossing of the andesite line and the need to adapt (in contrast to Fiji and Tonga) to the biogeographically most impoverished part of the Pacific (Green 1974: 267, 275).

*The Ferry Berth Site*

Our original information on the first collections of pottery from the site at the Mulifanua end of the island of Upolu and Western Samoa was limited to some 563 sherds, of which some 8 percent were decorated, and to some general comments on its location. More detailed records made by Jennings (1974), in cooperation with the project engineer, T. T. Hassall (who was in charge of the blasting and dredging to create a turning basin and berth for the interisland ferries), have revealed the precise location and stratigraphic context (Figure 3). All evidence indicates that the site was an elongated settlement on a former coral-sand beach located parallel to the present-day shoreline, a beach which is now approximately 2.7 meters below mean sea level. It would appear that refuse from the settlement was submerged and sealed in fairly quickly through a rise in sea level in relation to the land, so that deposits were little disturbed and most sherds not badly eroded.

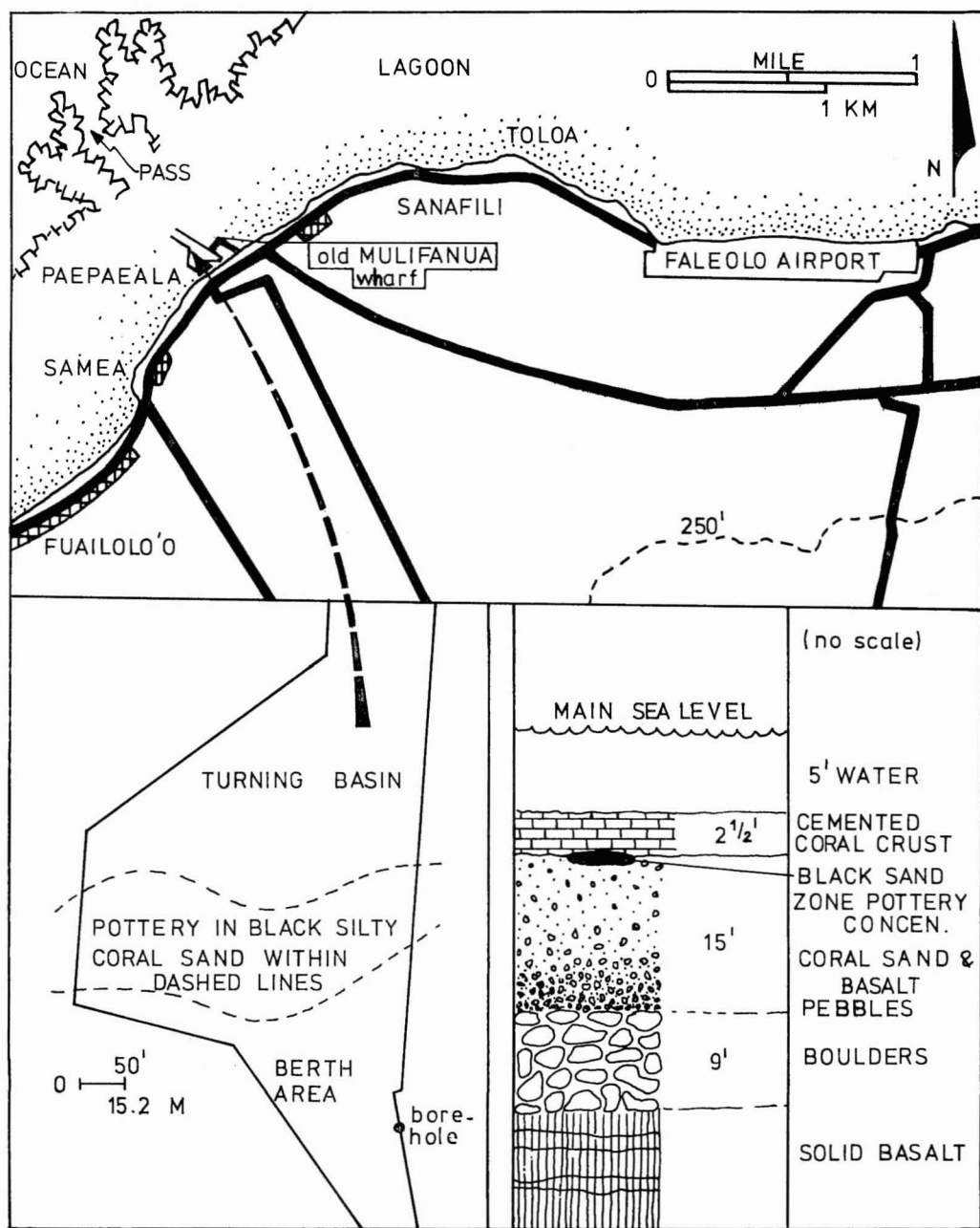


FIGURE 3. Location and geological context of Ferry Berth site, Western Samoa.

The problem of whether the changes were movements of land or sea level or both has not been resolved.

More recent collections from dredging in the turning basin have provided an additional 4288

sherds, of which 4.1 percent are decorated. Among the Plain Ware sherds were 873 pieces of interest belonging to rims, necks, shoulders, and bases of a variety of vessels of typical Lapita forms. It is probable that the percentage of

decorated ware is somewhat lower than it should be, for we know that some decorated pieces were retained by various interested parties. It is also probable that the amount of decoration in the first collection is somewhat high owing to an initial interest in these pieces. Thus, approximately 5 to 7 percent of the pottery in the site belongs to the decorated category.

From the style and frequency of the decorated sherds of pottery, from the vessel forms represented, from  $^{14}\text{C}$  ages for comparable pottery from Fiji and Tonga, and from  $^{14}\text{C}$  ages for coral and shell overlaying the site (see below), we can assign it to the Early Eastern Lapita style of the Lapita ceramic series (Green 1974) and place its age at circa 1000 B.C. From the studies of the temper of the pottery in all sites in Samoa, we can confidently say not only that the Ferry Berth pottery was made locally, but also that it was probably made on the end of the island on which it was found (Dickinson 1974). Finally, from a close analysis of techniques of manufacture, vessel form, and decoration, we can argue with reasonable confidence that the Lapita pottery of Samoa was ancestral to the well-dated Polynesian Plain Ware of the first few centuries B.C. to the first few centuries A.D., before pottery manufacture in Samoa ceased (Green 1974: 248). This latter pottery, of course, is that associated with cultural assemblages containing the range of other portable artifacts and structural features that begin the well-documented and continuous part of the Samoan sequence of the last 2300 years. We conclude that the Ferry Berth site represents a local assemblage of the Lapita complex at the early end of the Samoan sequence, after which there is a gap before reaching materials from the first few centuries B.C.

#### *Relative Changes in Sea Level*

As stated above, the explanation of the Samoan site being below present sea level can be interpreted either by changes in sea level or by movements of the land. As far as Holocene changes in sea level are concerned, there are two major schools of thought. One, proposed by Fairbridge (1961), shows several stands of the sea as being higher than at the present, all

within the past 6000 years. The other interpretation, held by Shepard (1963) and others, indicates a gradual rise of the sea from the last glacial episode to the present, with no stands being higher than now.

As will be stated below, other Lapita sites in the Polynesian region occur on "raised beaches" above present sea level. This might seem to confirm the "Fairbridge Curve," indicating sea level both above and below that of the present during the late Holocene. On the other hand, it must be realized that many of these islands are highly tectonic, and, therefore, it is equally possible that the higher beaches with the Lapita cultural material were uplifted during relatively recent times.

The presence of the cultural material below present sea level and covered with a coquina deposit can be explained by a lower sea level during the Holocene rise from the glacial low stand. A sea level about 3000 years ago that was some 2.7 meters lower than that of today is logical. Furthermore, it does not disprove Fairbridge's contention of a Holocene sea stand higher than that of today.

#### *Molluscan Fauna*

Seven species of marine mollusks have been identified from the coquina lying above the cultural layer. These are: Gastropoda—*Euchelus stratus* (Gmelin), *Turbo* sp. (operculum only), *Cerithium aluco* (Linnaeus), *Strombus mutabilis* Swainson, *Cypraea annulus* Linnaeus, and *Bulla ampula* (Linnaeus); Bivalvia—*Fragum fragum* (Linnaeus). All are living today in Samoan waters and are generally found from the intertidal line to a depth of 5 meters of water. All live in the vicinity of coral lagoons or reefs.

#### $^{14}\text{C}$ Carbon Dates

Two radiocarbon results confirming previous estimates of 2800 to 3000 years B.P. (Jennings 1974: 176; Green and Davidson 1974: 224) are now available. The samples used were pieces from the base of the cemented coral crust or coquina (Figure 3) which contained shells and pieces of pottery as inclusions. One result, NZ 1958, dates the shells included in field sample

TABLE 1

RESULTS OF  $^{14}\text{C}$  CARBON TESTING OF CORAL CRUST OR  
COQUINA LAYER FROM SUBMERGED BEACH OFF  
WESTERN SAMOA

SAMPLE	STANDARD	AGE IN YEARS BEFORE 1950
NZ 1958A	old T $\frac{1}{2}$	$2890 \pm 80$
NZ 1958B	new T $\frac{1}{2}$	$2980 \pm 80$
NZ 1959A	old T $\frac{1}{2}$	$2170 \pm 70$
NZ 1959B	new T $\frac{1}{2}$	$2230 \pm 70$

NOTE: Corrections supplied by the New Zealand Radiocarbon Dating Laboratory.

SU/C/18/1; the other, NZ 1959, the coral that formed the cementing agent. Results in the form as they are now reported by the New Zealand Radiocarbon Dating Laboratory are shown in Table 1. As requested by the laboratory, I discussed the first result with J. C. Schofield of the New Zealand Geological Survey, Otago, because the laboratory was worried about the possibility of recrystallization in the coral during or after cementation. Basing his opinion on other work, Schofield correctly predicted that the coral result would prove to be too young and would have to be checked against the shell inclusions. He also believed that the coral crust would have formed fairly rapidly, so that no great interval in time need have elapsed between abandonment of the site and the formation of the protecting coral crust. This fits with the generally good state of preservation of most of the pottery sherds and the shells. Since the age of the shell inclusions conforms with expectations, both in relation to the coral date and to previous estimates for pottery assemblages of this type, we accept it as a reasonable estimate.

#### *Other Lapita Sites*

Other Lapita sites, a few of them of slightly greater antiquity, are known from Tonga, Fiji, New Caledonia, the New Hebrides, and the Santa Cruz group. Some are associated with changes between land and sea levels. Thus, early sites on Malo in the New Hebrides are on a raised beach level inland of the present coast (J. Hedrick, personal communication to R. C.

Green), as is the earliest site on Santa Cruz Island (Nendö) of three dated sites in the Santa Cruz group. Sites in New Caledonia are also associated with raised beaches, which may indicate former higher stands of sea level (Frimigacci 1971, 1974), as may some of the sites in Tongatapu (Groube 1971: 297). On Niutoputapu, all Lapita sites are confined to a former raised beach level that encircles the rising center of the island, whereas none are found in the exposed former lagoon flats later used for occupation (Rogers 1974). Thus, archaeological evidence of Lapita materials from a wide area of geologically fairly diverse island types is associated with relative changes between land and sea level from 1300 B.C. to about 500 B.C. In this context, the presence of a Lapita site in Samoa from a now submerged situation is sufficiently interesting to warrant further geological investigation.

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